

WHAT IS CLAIMED IS:

Sub B.1.7 1. A thermal head comprising:
a metal substrate;
an insulating layer formed on the surface of said metal substrate;
a plurality of heating elements disposed on the surface of said insulating layer, said heating elements being arranged with a predetermined pitch along a plurality of lines in a main scanning direction, said plurality of lines being spaced from each other in a paper feeding direction perpendicular to the main scanning direction; and
a heat radiating element projecting from the surface of said metal substrate to the side where said insulating layer is disposed.

2. The thermal head according to Claim 1, wherein a part, in contact with one line of said heating elements, of said insulating layer and a part, in contact with a directly adjacent line of said heating elements, of said insulating layer are separated from each other by said heat radiating element.

3. The thermal head according to Claim 1, wherein said heat radiating element is disposed at least in a part of a

region between said metal substrate and a gap between one line of said heating elements and an adjacent line of said heating elements, and wherein a part, in contact with one line of said heating elements, of said insulating layer and a part, in contact with a directly adjacent line of said heating elements, of said insulating layer are connected to each other in a region in contact with said gap so that heat can be conducted therebetween.

4. The thermal head according to Claim 1, wherein said heat radiating element is formed integrally with said metal substrate.

5. The thermal head according to Claim 1, wherein portions, in contact with said heating elements, of said insulating layer protrude in a direction toward said heating elements.

6. The thermal head according to Claim 1, wherein said heating elements are disposed such that the location, in the main scanning direction, of each heating element is coincident with the location of one of heating elements arranged in an adjacent line.

7. The thermal head according to Claim 1, wherein said

heating elements are disposed such that the location, in the main scanning direction, of each heating element is shifted by 1/2 pitch relative to the location of one of heating elements arranged in an adjacent line.

8. The thermal head according to Claim 1, wherein said metal substrate includes a fin formed on a side opposite to the side on which said insulating layer is formed.

9. The thermal head according to Claim 1, wherein two conductor patterns for supplying a current to each heating element to generate heat are connected to each heating element, on the side opposite to said insulating layer.

10. A thermal head controller for controlling a thermal head for use in a printer, said thermal head serving to form an image with at least one color on print paper, said thermal head including a preheating heater and a printing heater, said thermal head controller comprising:

preheating control means for controlling preheating of each line performed by said preheating heater; and

amount-of-heat correction means for correcting the amount of heat generated by said preheating heater for each line such that the effective amount of preheating heat is maintained substantially constant over all lines.

11. The thermal head controller according to Claim 10, further comprising temperature detection means, wherein said amount-of-heat correction means corrects the amount of heat in accordance with a temperature value detected by said temperature detection means.

12. The thermal head controller according to Claim 11, wherein said temperature detection means includes at least one of an inside-of-printer temperature detector and a preheater temperature detector.

13. The thermal head controller according to Claim 11, wherein said temperature detection means includes both an inside-of-printer temperature detector and a preheater temperature detector.

14. The thermal head controller according to Claim 13, wherein said amount-of-heat correction means corrects the amount of heat depending upon a printing mode, a temperature inside the printer, a preheater temperature, and a line number.

15. The thermal head controller according to Claim 14, wherein at the beginning of a printing operation for one

surface of paper, said amount-of-heat correction means selects data to be used depending upon the printing mode, the temperature inside the printer, and the preheater temperature, and said amount-of-heat correction means determines, from said data, an amount of correction of heat depending upon the line number and corrects the amount of heat by said determined amount of correction during the printing operation for said one surface of paper.

16. The thermal head controller according to Claim 13, wherein said amount-of-heat correction means corrects the amount of heat depending upon a printing mode, a temperature inside the printer, and a preheater temperature.

17. The thermal head controller according to Claim 16, wherein at the beginning of a printing operation for one surface of paper, said amount-of-heat correction means selects data to be used depending upon the printing mode and the temperature inside the printer, and said amount-of-heat correction means determines, from said data, an amount of correction of heat depending upon the preheater temperature and corrects the amount of heat by said determined amount of correction during the printing operation for said one surface of paper.

18. The thermal head controller according to Claim 10, wherein said preheating control means energizes said preheating heater in a period in which printing is not performed by said printing heater and which is within a printing cycle.

19. The thermal head controller according to Claim 18, wherein said preheating control means includes:

a first gate circuit for generating, in response to starting of a printing cycle for each line, a first signal indicating an energization start time of said preheating heater;

a second gate circuit for generating a second signal indicating an energization end time at which the energizing of said preheating heater should be ended before starting energizing of said printing heater; and

a third gate circuit for generating a preheating signal in accordance with said first signal and said second signal such that said preheating signal is activated over a period from the energization start time of the preheating heater to the energization end time,

and wherein said energization end time is changed by said amount-of-heat correction means.

20. A thermal head controller for controlling a

thermal head for use in a printer, said thermal head serving to form an image with one or more colors on print paper, said thermal head including a preheating heater and a printing heater, said thermal head controller comprising:

signal generating means for generating a control pulse signal serving as a reference signal according to which the energizing of said printing heater is controlled; and

preheating control means for controlling the energizing of said preheating heater by means of counting said control pulse signal.

21. A thermal head controller according to Claim 20, wherein said preheating control means includes:

a counter which counts pulses of said control pulse signal and outputs a predetermined signal when the counted number of pulses reaches a value predetermined as a preset value;

a flip flop for latching predetermined data and outputting it in response to said predetermined signal serving as a trigger signal; and

a switch connected in series to said preheating heater, for controlling the energization of said preheating heater in accordance with a signal output from said flip flop.

22. The thermal head controller according to Claim 21,

wherein before starting preheating using said preheating heater, said counter inputs a value as a preset value indicating a time at which the preheating should be started.

23. The thermal head controller according to Claim 10, further comprising signal generating means for generating a control pulse signal serving as a reference signal according to which the energizing of said printing heater is controlled, wherein said preheating control means controls the energizing of said preheating heater by means of counting said control pulse signal.

24. The thermal head controller according to Claim 23, wherein said preheating control means includes:

a counter which counts pulses of said control pulse signal and outputs a predetermined signal when the counted number of pulses reaches a value predetermined as a preset value;

a flip flop for latching predetermined data and outputting it in response to said predetermined signal serving as a trigger signal; and

a switch connected in series to said preheating heater, for controlling the energization of said preheating heater in accordance with a signal output from said flip flop.

25. The thermal head controller according to Claim 24, wherein before starting preheating using said preheating heater, said counter inputs a value as a preset value indicating a time at which the preheating should be started.

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